

NEW AND NOTEWORTHY ORCHIDS OF THE BISMARCK ARCHIPELAGO, PAPUA NEW GUINEA

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ABSTRACT

A general account is provided of the orchid gatherings from the 1994 Conservation International survey of southern New Ireland, an area identified by environmental assessment as one of Papua New Guinea's major terrestrial unknown regions. One new species (*Dendrobium archipelagense*) and one new variety (*Dendrobium vexillarius* J.J. Sm. var. *hansmeyerense*) are described and illustrated. Several distributional records are reported. Illustrations are provided for most of the cited taxa.

KEY WORDS: Botanical survey, *Dendrobium*, New Ireland, Orchidaceae, Papua New Guinea

JAPANESE ABSTRACT

パプアニューギニアの中でも最も生態的調査が遅れている地域といわれる、ニューアイルランド島南部において、1994年にコンザベーションインターナショナルによる調査が行われた。この調査において採集された蘭に関する報告を行う。

Dendrobium archipelagense と *D. vexillarius* J.J. Sm. var. *hansmeyerense* の2つの新種の蘭の形態に関して記述と図説を行い、幾つかの分布地域に関しても報告する。

INTRODUCTION

Originally a part of the German Territory of New Guinea, the Bismarck Archipelago consists primarily of New Britain, New Ireland, and Manus. These islands are now separate provinces of the sovereign state of Papua New Guinea (PNG). The Archipelago is collectively designated as the 'Islands Region' by national administrators, and also includes several minor islets scattered outboard of New Ireland, as for example, the St. Matthias group, Lihir, and Tabar (Fig. 1).

The Bismarck Archipelago represents one of PNG's most poorly documented floristic regions (Takeuchi & Golman 2001). It is unfortunately the most intensively logged territory in the country: 50% of the archipelagic land area is currently under timber concessional development (ibid.). Because of the paucity of biodiversity information, the forested tracts in southern New Ireland are ranked among PNG's 16 terrestrial unknowns and are also included in the country portfolio of high-priority sites for conservation action (Johns 1993: 25; Sekhran & Miller 1995: 113–15).

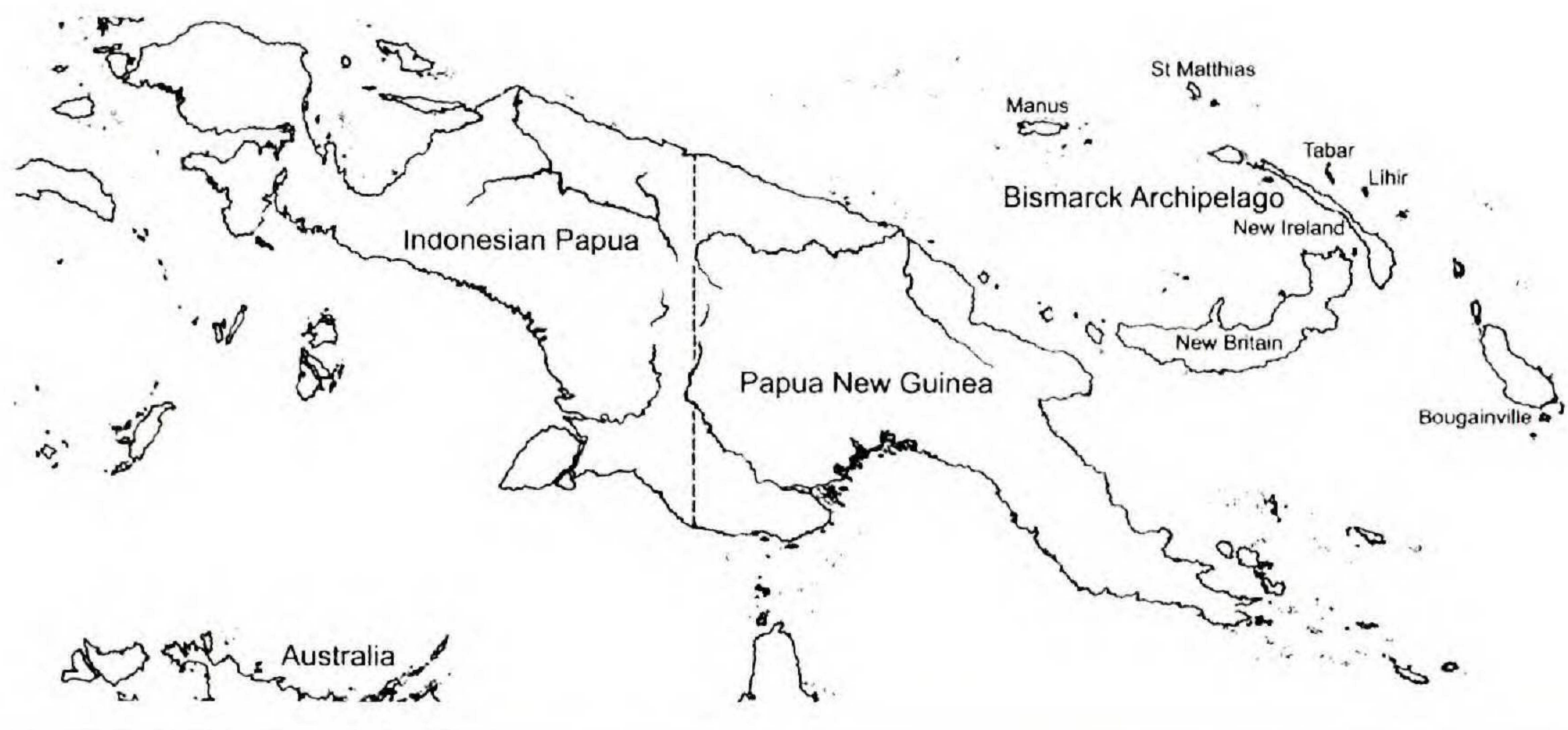


FIG. 1. Island of New Guinea, and the Bismarck Archipelago.

In order to assess the status of its environments, from January 14 to February 16, 1994, a 13-member team conducted an elevation-sequenced survey in the Weitin Valley and Hans Meyer Range of southern New Ireland. Although the survey's collective findings have been recently published (Beehler & Alonso 2001), the orchid vouchers were treated in a separate checklist (Howcroft 1994). In the following discussion, the orchids from the 1994 survey are given further consideration. Occurrence notes from other areas within the Archipelago have also been added when appropriate.

DESCRIPTIONS OF NEW TAXA

***Dendrobium vexillarius* J.J. Sm. var. *hansmeyerense* Howcroft & Takeuchi, var. nov. (Fig. 2).** TYPE: PAPUA NEW GUINEA. NEW IRELAND PROVINCE: Hans Meyer Range, Angil Mountain, expedition camp 4 in pristine subcloud forest, 4°25.2' S, 152°56.8' E, 1800 m, 6 Feb 1994 (fl, fr, spirit), W. Takeuchi & J. Wiakabu 9453 (HOLOTYPE: LAE).

A var. *vexillarius* sepalis latioribusque abaxialis cristatus differt.

Distribution and ecology.—Known thus far only from the type locality, in mossy montane forest at 1800 m.

Etymology.—The new variety is named after the type locality.

Dendrobium vexillarius was previously represented by six varieties separated primarily by the color of the perianth (Reeve & Woods 1989: 250). A prominent abaxial crest on the lateral sepals distinguishes var. *hansmeyerense* from other infraspecific taxa.

The new variety was collected earlier during the 1975 Kew expedition to New Ireland (i.e., Sands *et al.* 1985, 2349, 2374, 2399). Reeve and Woods (1990) had tentatively assigned these specimens to variety *uncinatum*. However that variety is not prominently crested on the abaxial side of the lateral sepals as with var. *hansmeyerense*. Keels are sometimes present among the varieties of *D.*

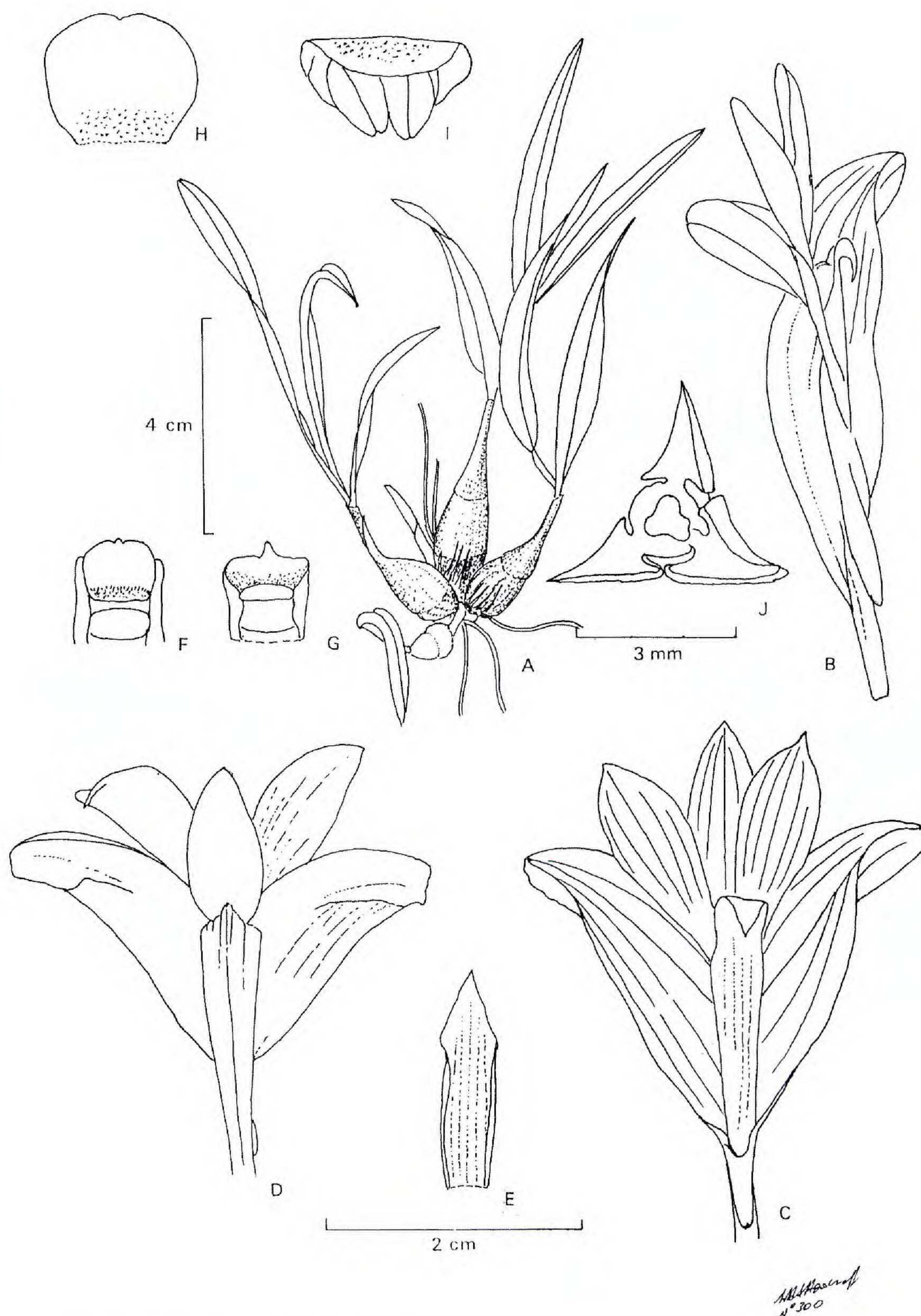


FIG. 2. *Dendrobium vexillarius* J.J. Sm. var. *hansmeyerense* Howcroft & Takeuchi. A. Habit. B. Flower, side view. C. Flower, from below. D. Flower, from above. E. Labellum, midsection to apex. F–G. Column apex with and (G) without anther. H. Anther, front view. I. Anther with pollen, oblique rear (or anterior) view. J. Ovary in cross-section. Scale bars: A, 4 cm; B–E, 2 cm; F–G, 3 mm; H–I (enlarged 30×); J, 3 mm. Drawn from the type by N.H.S. Howcroft.

vexillarius but they are not prominent. The only other taxon in this section with a prominent abaxial keel is *D. brevicaule* Rolfe ssp. *pentagonum* (Kraenzlin) Reeve & Woods, with an otherwise very differently shaped ovary in cross-sectional view.

Dendrobium archipelagense Howcroft & Takeuchi, sp. nov. (**Fig. 3**). TYPE: PAPUA NEW GUINEA. NEW IRELAND PROVINCE: junction of Niagara and Weitin rivers, expedition camp 2, lowland rainforest, 4°30.210' S, 152°56.242' E, 240 m, Jan 1994 (fl. spirit), W. Takeuchi & J. Wiakabu 9979 (HOLOTYPE: LAE; ISOTYPE: A).

Dendrobio strepsiceroti J.J. Smith, *Dendrobio antennato* Lindley affinis sed differt forma ac amplitudine labelli, lobis lateralibus oblongi-ellipticis (non quadrati-ellipticis) apicibus rotundatis superpositis basim midlobi, et lamella triangulari carenti in parte distali midlobo.

Tufted epiphyte. **Rhizomes** short. **Pseudobulbs** swollen at the base, fusiform in the lower part, distally more slender, subcylindrical, with persistent nodal sheaths shorter than the internodes, leafy, to 50 by 1.0–2.0 cm. **Leaves** distichous, lanceolate-ovate, 7.5–9.5 by 2.0–3.0 cm, asymmetrically emarginate, adaxially slightly concave, abaxially convex, thick, coriaceous, green to yellow-green. **Inflorescence** racemose, one or several per pseudobulb, inserted at the apex or slightly below, erect, rachis to 40 cm by 2–3 mm; peduncle to 9 cm long, peduncular and floral bracts tubular; pedicel glabrous, ca. 2.2 cm long. **Flowers** 5–10 per raceme, usually wide-opening, 4.0–5.5 by 3.5 cm, pale green to yellow-green. **Dorsal sepal** recurved, twisted through one turn, oblong-lanceolate, 2.0–2.6 by 0.6–0.7 cm, acuminate. **Lateral sepals** recurved, oblong-lanceolate, 2.5–3.3 by 0.9 cm at the base, apex acute or acuminate. **Mentum** narrowly conical, 0.9–1.0 cm long, apex straight or slightly decurved. **Petals** linear, acute, 3.0–4.5 by 0.25–0.4 cm, twisted through one or two turns, spreading. **Labellum** porrect, 3-lobed, 2.0–2.3 by 1.0–1.5 cm, similar in color to sepals and petals but with some purple venation; lateral lobes oblong-elliptic, 1.15 by 1.5 cm, over-lapping base of the midlobe, apex rounded; midlobe ovate, 1.0 by 1.0 cm, acute to apiculate, not recurved; callus of 5 keels, the lateral ones not extending past the base of the midlobe, the median keel extending to the apex of the midlobe, slightly raised, not lamellate or crested. **Column** 0.5 cm long, apex laterally bilobed, foot at 10° to column. **Ovary** glabrous, 0.9 cm long.

Distribution and ecology.—Widely distributed throughout the Bismarck Archipelago, frequently on trees near the coast but also from inland areas. The type locality is lowland rainforest at 240 m.

The new species seems to flower mainly during the first half of each year. In addition to the type specimen (flowering in Jan), cultivated plants have produced flowers continuously from May to Jul. Seeds from the previous year's set, are released simultaneously with the production of new flowers.

Etymology.—The epithet reflects the distributional restriction to the Bismarck Archipelago.

Within section *Spatulata* Lindl., the novelty's closest relative appears to be

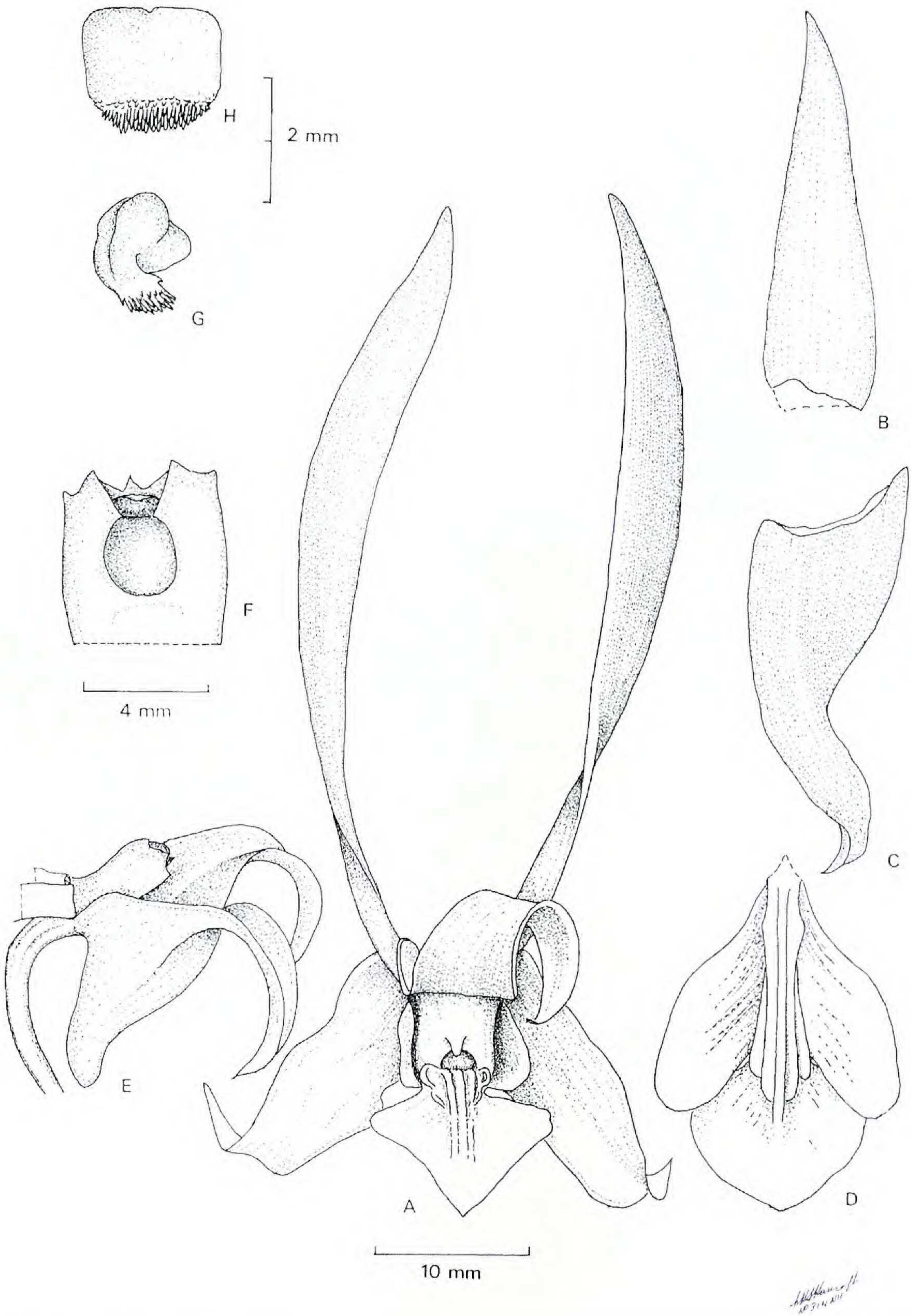


FIG. 3. *Dendrobium archipelagense* Howcroft & Takeuchi. **A.** Flower, aspect. **B.** Dorsal sepal. **C.** Lateral sepal. **D.** Labellum. **E.** Spur, with lateral sepals and column. **F.** Column apex with stigma, from below. **G.** Anther, lateral view. **H.** Anther, frontal view. Scale bars: A–E, 10 mm; F, 4 mm; G–H, 2 mm. Drawn from the type by N.H.S. Howcroft.

Dendrobium antennatum Lindl. In his treatment of this section, Cribb (1986: 618) recognized several species groups, among them the *antennatum* group with 9 species. The new species was formerly placed in *D. strepsiceros* J.J. Sm. by Cribb (ibid.: 637), O'Byrne (1994: 236), and Lavarack et al. (2000: 262).

Smith's illustration of *D. strepsiceros* (1913: Fig. 4, B1, B2) shows that its labellum differs from the corresponding characters in the new species. In *D. strepsiceros* the labellum midlobe is larger than the lateral lobes, and the apices of the latter do not overlap the base of the midlobe as it does in live specimens of *D. archipelagense* (Fig. 3). This distinction can be lost in the preparation of dried specimens so the relationship between the lobes is best seen with spirit material. Apart from the difference in shape and extension of the lateral lobes, *D. archipelagense* has a shorter labellum compared to *D. strepsiceros* and is more similar to *D. antennatum* on that feature.

Compared to its closest congeners, the lateral lobes of the new species are proportionately larger in relation to the length of the labellum. In *D. archipelagense*, the lateral lobe is 70–80% of the labellum length, in *D. antennatum* 55–70%, and in *D. strepsiceros* 50–58% (Fig. 4).

There are five ridges on the callus of the labellum in all of the preceding species. The mid-callus ridge for *D. archipelagense* extends towards the apex of the midlobe, but is not raised to a triangular lamella as described for *D. strepsiceros*. This character may have been overlooked by other authors.

The new species has long petals which make the flower appear larger than typical *D. antennatum*. As many as ten flowers can be produced by one inflorescence. The color of the perianth is initially light green but turns yellow-green with age. In most individuals, the ridges of the labellum are bordered with violet, and there are also violet reticulations up to the median, and sometimes the distal portion of the midlobe. The perianth is persistent on the fruit, a characteristic shared by other species in the *antennatum* group.

No significant color differences have been seen between specimens from West New Britain, East New Britain, and New Ireland. However in terms of flower size, the type collection represents one of the largest and most attractive forms seen by the senior author.

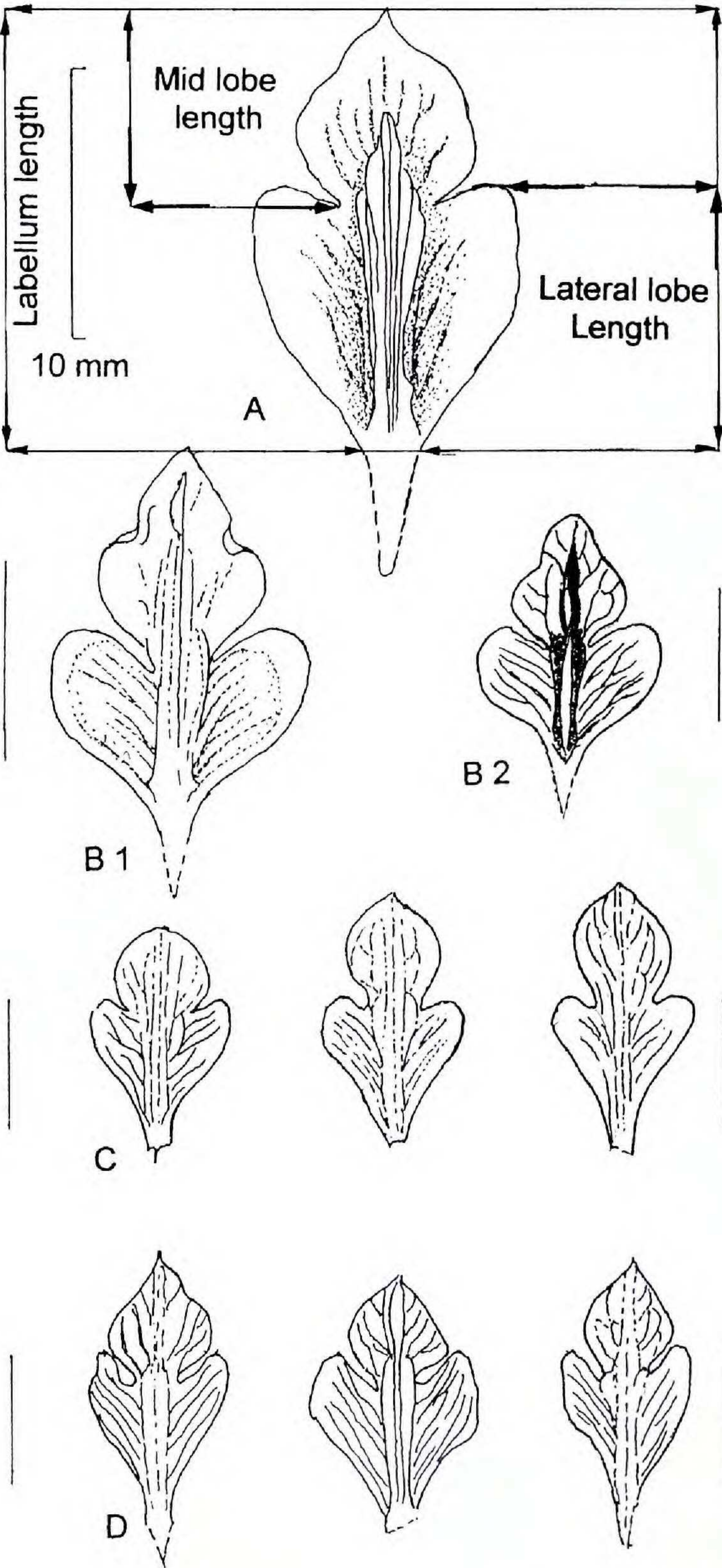
DISTRIBUTIONAL RECORDS

Arachnis beccarii Reichb. f. var. **imthurnii** (Rolfe) Tan, Selbyana 1:1–15. 1975; 1:365–373. 1976. (**Fig. 5**).

Specimen examined: **PAPUA NEW GUINEA. New Ireland Province:** junction of Niagara and Weitin rivers, expedition camp 2, lowland rainforest, 4°30.210' S, 152°56.242' E, 240 m, Jan 1994 (fl, spirit), W. Takeuchi & J. Wiakabu 9968 (LAE).

The genus *Arachnis* is represented by two species in New Guinea, of which only *A. beccarii* occurs in the Bismarck Archipelago.

Variety *imthurnii* had been previously recorded from Bougainville,



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FIG. 4. **A.** Labellum structure. **B1.** *Dendrobium strepsiceros* J.J. Sm., from Smith (1913). **B2.** *D. strepsiceros*, from Cribb (1986). **C.** *D. antennatum* Lindl. **D.** *D. archipelagense* Howcroft & Takeuchi. All scale bars: 10 mm.

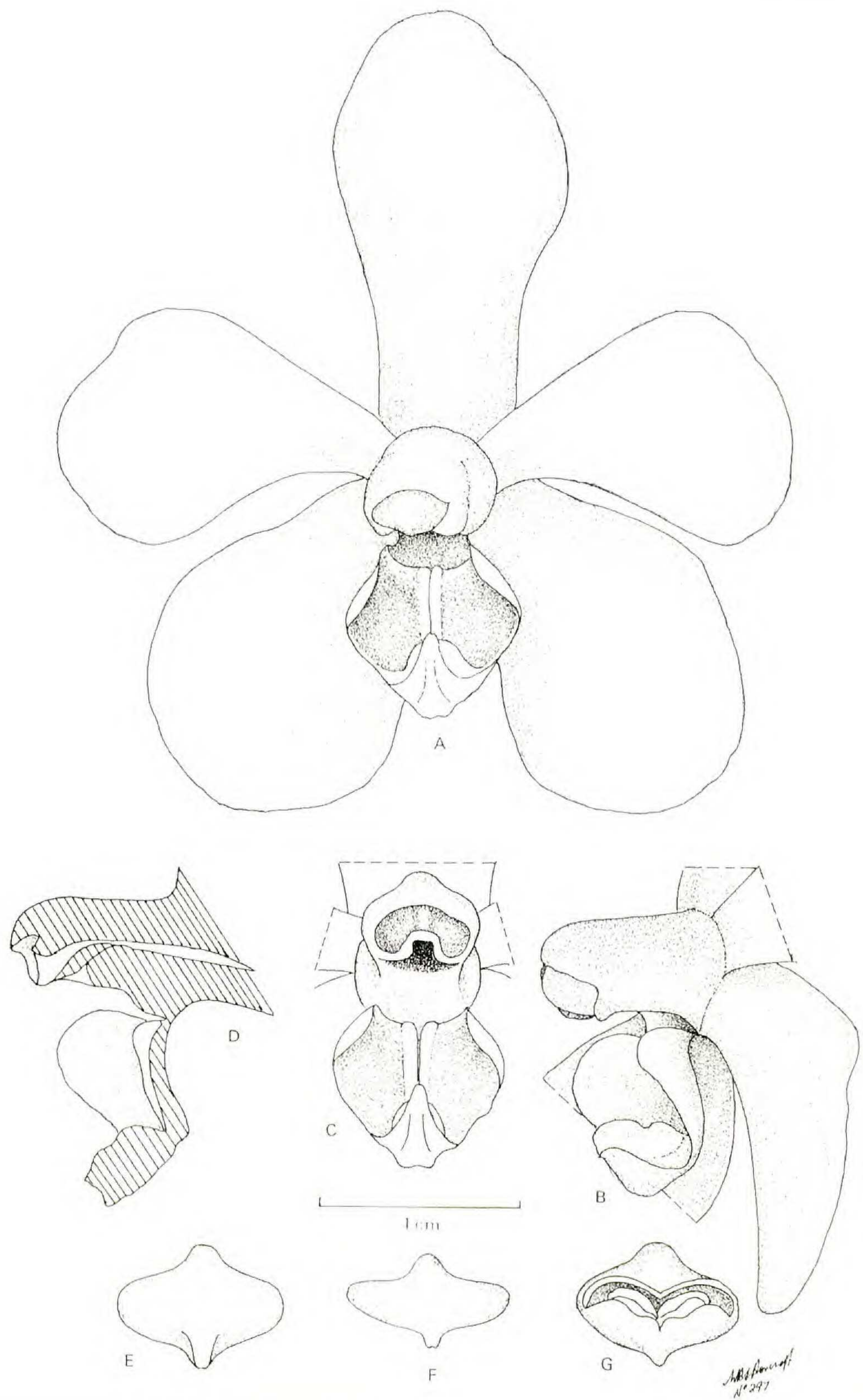


FIG. 5. *Arachnis beccarii* Reichb. f. var. *imthurnii* (Rolfe) Tan. **A.** Flower, frontal aspect. **B.** Labellum and column, side view. **C.** Labellum and column, frontal view. **D.** Labellum and column, cross-section. **E.** Anther, frontal view. **F.** Anther, from above. **G.** Anther, from back, showing pollen. Scale bars: A–G, 1 cm. Drawn from *W. Takeuchi & J. Wiakabu 9968* by N.H.S. Howcroft.

Guadalcanal, Malaita, and Santa Isabel (Lewis & Cribb 1991). It was also seen by the senior author on the Toriu River side of the Kanak Range in East New Britain. The New Ireland specimen is a distributional record for the island.

Although var. *imthurnii* is reported as having an entirely white perianth (ibid.), the New Ireland provenance is marked by large brown spots. Cultivated plants in the National Botanical Gardens at Lae have also produced flowers with color markings different from mainland and archipelagic provenances. The distinctions can be used to justify eventual reinstatement of this variety to specific rank.

Corybas epiphyticus (J.J. Sm.) Schltr., Feddes Repert. Spec. Nov. Regni Veg. 19:21. 1923. (**Fig. 6**).

Specimen examined: **PAPUA NEW GUINEA. New Ireland Province:** Hans Meyer Range, Angil Mountain, expedition camp 4, pristine subcloud forest dominated by bryophytic and ferny growth, 4°25.2' S, 152°56.8' E, 1800 m, 6 Feb 1994 (fl, spirit), W. Takeuchi & J. Wiakabu 9461 (LAE).

Previously known only from Indonesian Papua (van Royen 1983). The collection from New Ireland represents a significant eastward extension of the species range. *Corybas epiphyticus* is still unrecorded from the PNG mainland.

Dendrobium gnomus Ames, J. Arnold Arbor. 14:106–107. 1933. (**Fig. 7**).

Specimen examined: **PAPUA NEW GUINEA. New Ireland Province:** Hans Meyer Range, ridge adjacent to the Weitin River, expedition camp 3, mossy montane forest, 4°27.205' S, 152°56.489' E, 1175 m, 27 Jan 1994 (fl, spirit), W. Takeuchi & J. Wiakabu 9597 (LAE).

This species was initially mistaken for *Dendrobium erosum* (Bl.) Lindl. because of the spathulate shape of the labellum and its finely erose margins (Fig. 7F). However the leaf apex is unequally bilobed as with *D. gnomus* (Fig. 7A), whereas in *D. erosum* the apex is acute. The cucullate labellum apex on the New Ireland specimen is probably an artefact of drying. The shape of the sepals and petals, and the mentum being appressed to the ovary and pedicel rather than diverging, are also consistent with the redetermination (Figs. 7B–E).

The species had not been previously recorded for New Ireland.

Pedilochilus longipes Schltr., Feddes Repert. Spec. Nov. Regni Veg. Beih. 1:691. 1912. (**Fig. 8**).

Specimen examined: **PAPUA NEW GUINEA. New Ireland Province:** Hans Meyer Range, Angil Mountain, expedition camp 4, pristine subcloud forest dominated by bryophytic and ferny growth, 4°25.2' S, 152°56.8' E, 1800 m, 4 Feb 1994 (fl), W. Takeuchi & J. Wiakabu 9380 (LAE).

Previously known with certainty only from mainland New Guinea. The New Ireland specimen represents a distributional record.

Phaius amboinensis Bl., Mus. Bot. Lugd.-Bat. 2:180. 1856. (**Fig. 9**).

Specimen examined: **PAPUA NEW GUINEA. New Ireland Province:** junction of Niagara and Weitin rivers, expedition camp 2, lowland rainforest, 4°30.210' S, 152°56.242' E, 240–300 m, 13 Feb 1994 (fl, fr, spirit), W. Takeuchi & J. Wiakabu 9780 (A, LAE).

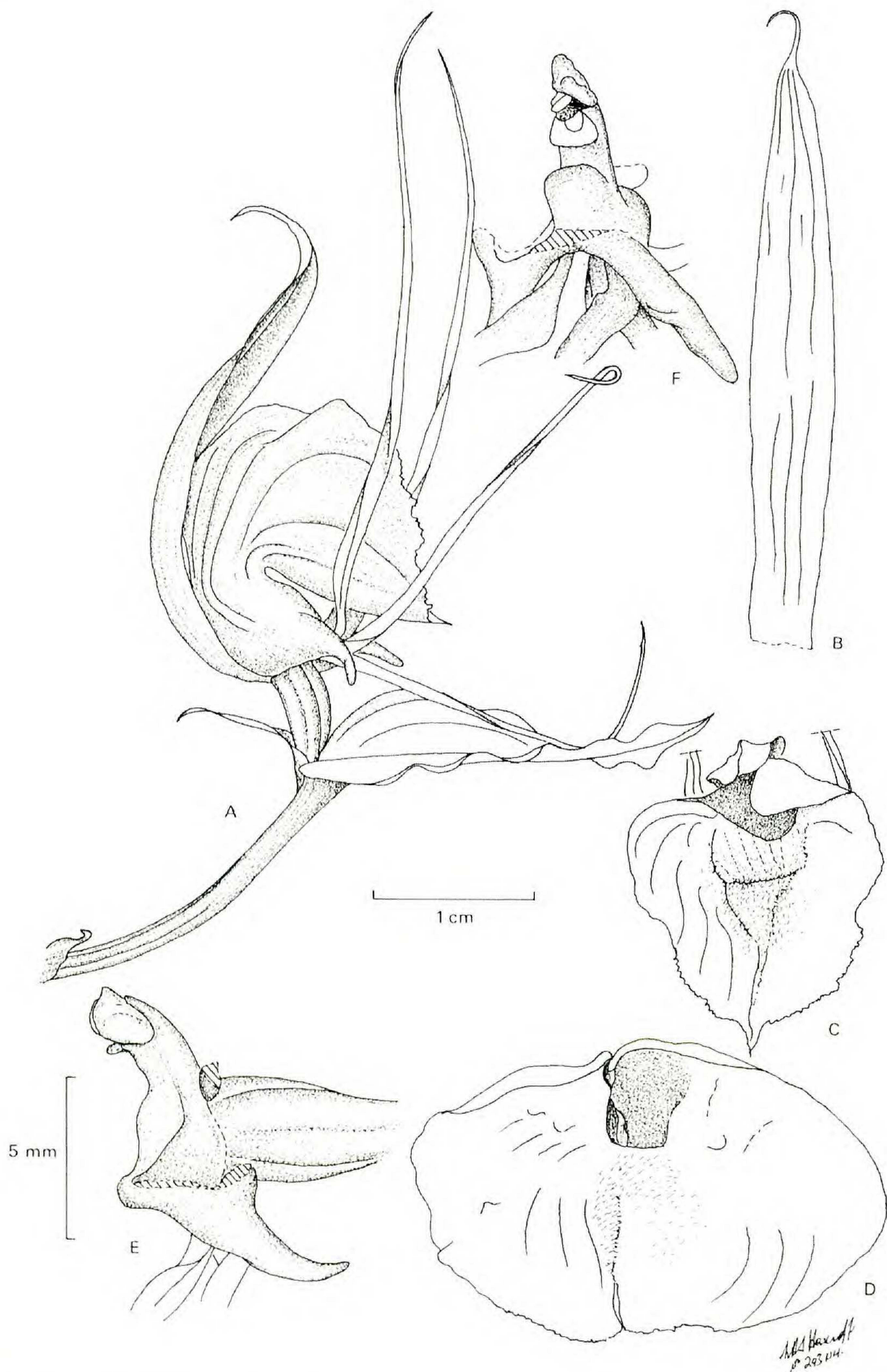


FIG. 6. *Corybas epiphyticus* (J.J. Sm.) Schltr. **A.** Flower and leaf, side view. **B.** Dorsal sepal. **C.** Labellum, frontal view. **D.** Labellum, with parts flattened and spread out. **E.** Column, showing ovary and one spur. **F.** Column with labellum removed and showing two lateral spurs. Scale bars: A–D, 1 cm; E–F, 5 mm. Drawn from W. Takeuchi & J. Wiakabu 9461 by N.H.S. Howcroft.

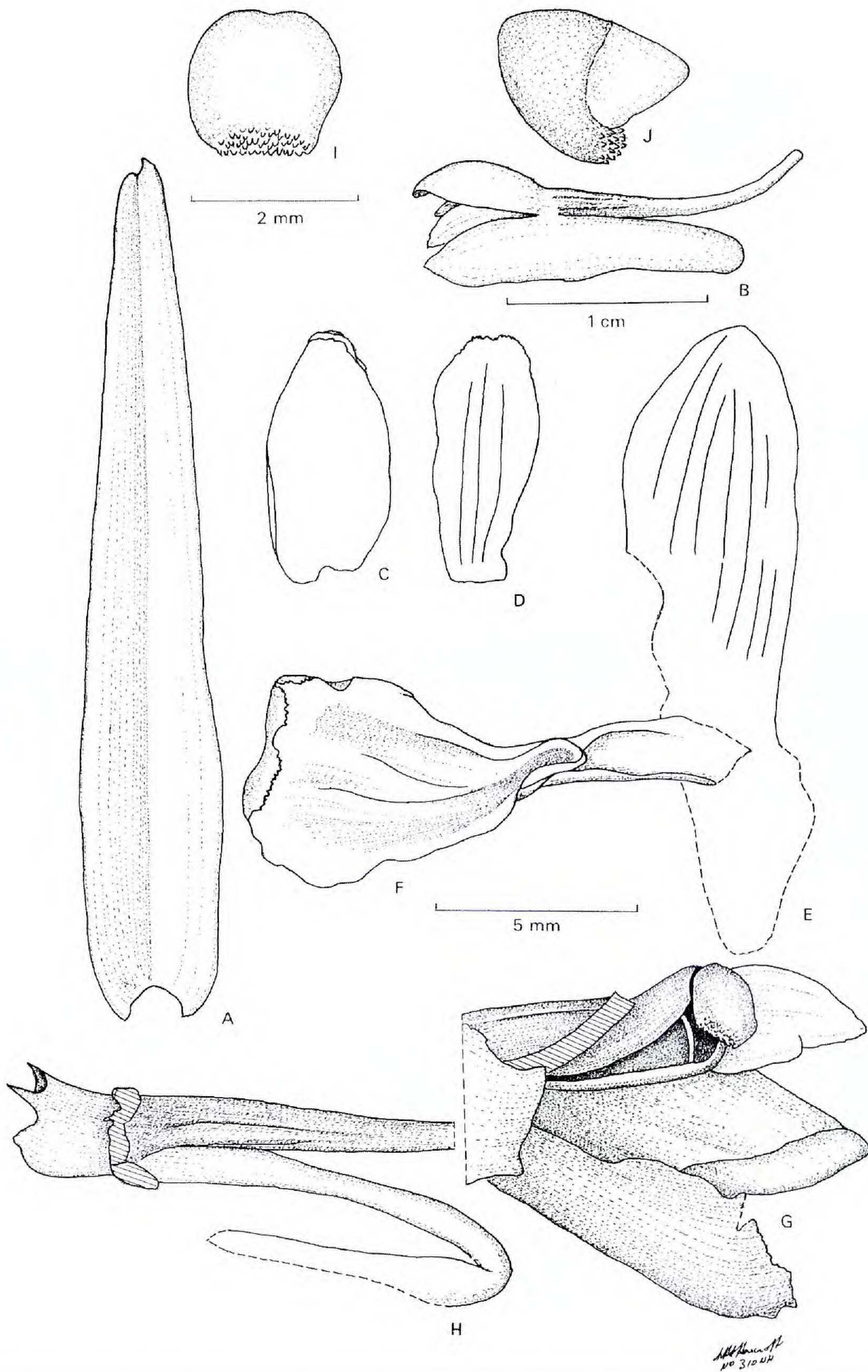


FIG. 7. *Dendrobium gnomus* Ames. **A.** Leaf. **B.** Flower, side view. **C.** Dorsal sepal. **D.** Petal. **E.** Lateral sepal. **F.** Labellum. **G.** Column, oblique side view. **H.** Column, ovary, and spur. **I.** Anther from front. **J.** Anther from side. Scale bars: A–B, 1 cm; C–H, 5 mm; I–J, 2 mm. Drawn from *W. Takeuchi & J. Wiakabu 9597* by N.H.S. Howcroft.

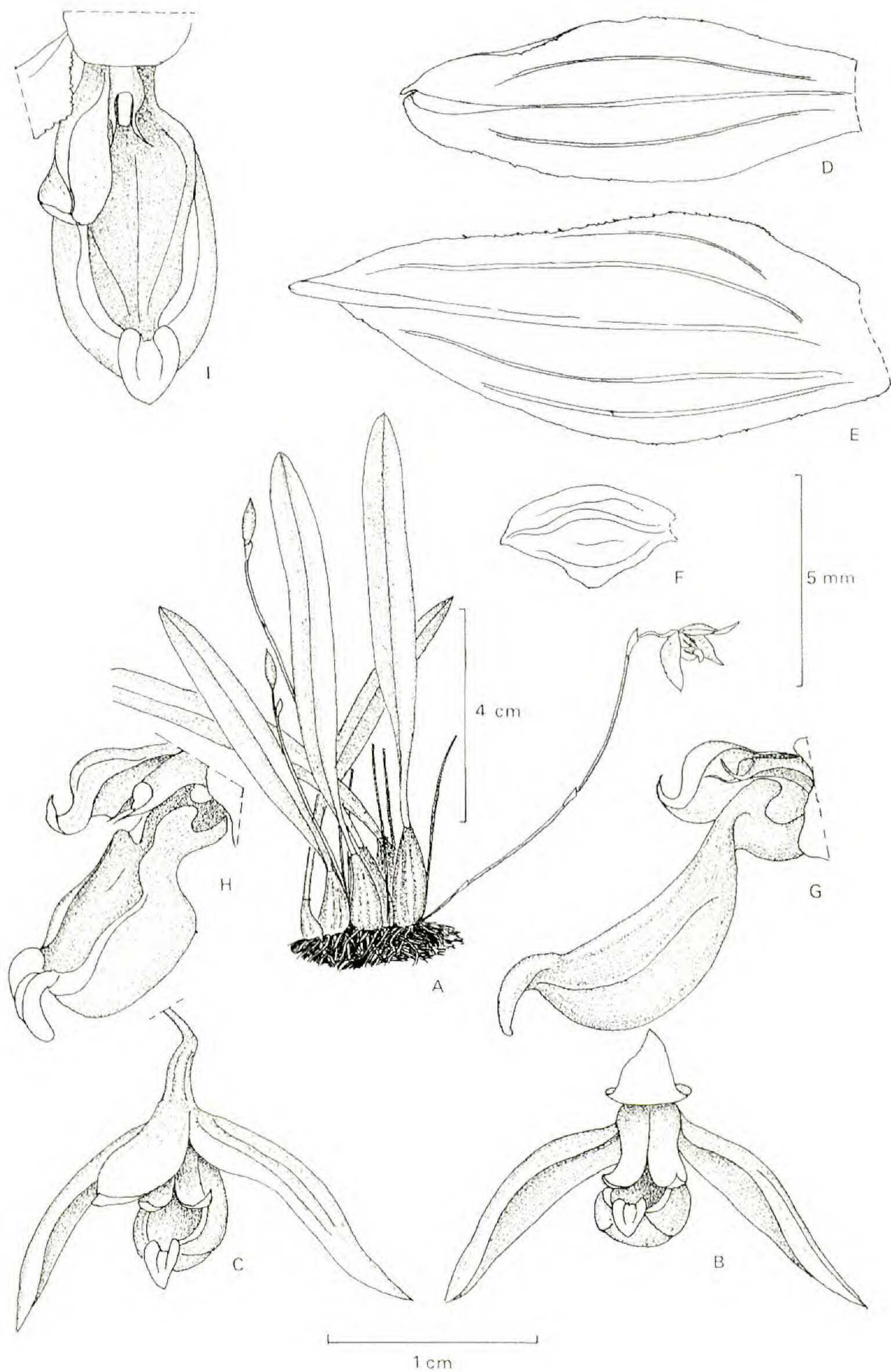


FIG. 8. *Pedilochilus longipes* Schltr. **A.** Habit, whole plants. **B.**–**C.** Flower, aspect. **D.** Dorsal sepal. **E.** Lateral sepal. **F.** Petal. **G.** Labellum with column and one petal, side view. **H.** ditto, oblique view. **I.** ditto, from above. Scale bars: A, 4 cm; B–C, 1 cm; D–I, 5 mm. Drawn from *W. Takeuchi & J. Wiakabu 9380* by N.H.S. Howcroft.

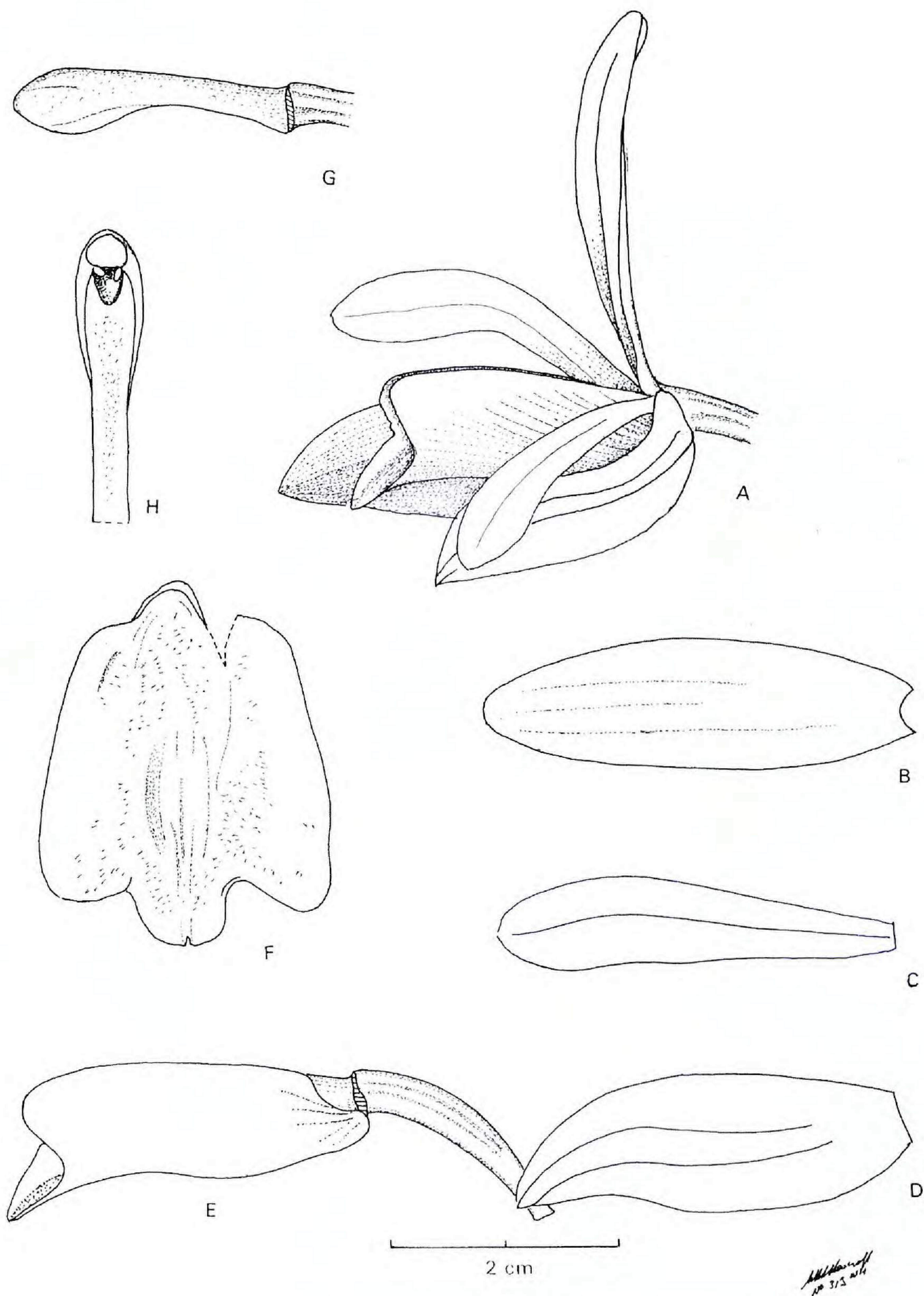


FIG. 9. *Phaius amboinensis* Bl. **A.** Flower, side aspect. **B.** Dorsal sepal. **C.** Petal. **D.** Lateral sepal. **E.** Labellum, side view. **F.** Labellum, flattened, view from above. **G.** Column, from side. **H.** Column, from below. Scale bars: A–H, 2 cm. Drawn from W. Takeuchi & J. Wiakabu 9780 by N.H.S. Howcroft.

A widespread orchid found on many islands in the Bismarck Archipelago, but not previously recorded from New Ireland. The species distribution includes Vanuatu, Fiji, Samoa, and Tahiti in the east. Also occurring in Java, the southern Philippines (Sulu Archipelago), Sulawesi, and the Moluccas.

Phreatia loriae Schltr., Feddes Repert. Spec. Nov. Regni Veg. 3:318. 1907.

Specimen examined: **PAPUA NEW GUINEA. New Ireland Province:** junction of Niagara and Weitin rivers, expedition camp 2, lowland rainforest, 4°30.210' S, 152°56.242' E, 240 m, 21 Jan 1994 (fl, spirit), W. Takeuchi & J. Wiakabu 9885A (LAE).

The species was previously known only from the southern PNG mainland.

Pristiglottis montana (Schltr.) Cretz. & J.J. Sm., Acta Fauna Fl. Univ. Bucur. ser. 2, Bot. 1, 14:4. 1934. (**Fig. 10**).

Specimen examined: **PAPUA NEW GUINEA. New Ireland Province:** Hans Meyer Range, Angil Mountain, expedition camp 4, pristine subcloud forest dominated by bryophytic and ferny growth, 4°25.2' S, 152°56.8' E, 1800 m, 4 Feb 1994 (fl, spirit), W. Takeuchi & J. Wiakabu 9394 (LAE).

The labellum of this specimen compares well with the illustration by Halle (1977). The new occurrence represents a significant disjunction from the previously known stations in Vanuatu and New Caledonia.

OTHER ILLUSTRATED COLLECTIONS

Bulbophyllum pachyglossum Schltr., Feddes Repert. Spec. Nov. Regni Veg. 16: 125. 1920. (**Fig. 11**).

Specimen examined: **PAPUA NEW GUINEA. New Ireland Province:** Hans Meyer Range, Angil Mountain, expedition camp 4, pristine subcloud forest dominated by bryophytic and ferny growth, 4°25.2' S, 152°56.8' E, 1800 m, 3 Feb 1994 (fl), W. Takeuchi & J. Wiakabu 9375 (LAE).

Bulbophyllum pachyglossum is a member of section *Brachyostele*, within which 3 species have been described for New Guinea. Of these, only *B. pachyglossum* has been recorded from the Bismarck Archipelago. The species is also known from the Solomon Islands (Lewis & Cribb 1991).

Cadetia echinocarpa Schltr., Feddes Repert. Spec. Nov. Regni Veg. Beih. 1:439. 1912. (**Fig. 12**).

Specimen examined: **PAPUA NEW GUINEA. New Ireland Province:** junction of Niagara and Weitin rivers, expedition camp 2, lowland rainforest, 4°30.210' S, 152°56.242' E, 240 m, 21 Jan 1994 (fl), W. Takeuchi & J. Wiakabu 9884 (LAE).

Possibly synonymous with the later name *C. homochroma* (J.J. Sm.) Schltr.

Calanthe triplicata (Willemet) Ames, Philip. J. Sci. Bot. 2:325. 1907. (**Fig. 13**).

Specimen examined: **PAPUA NEW GUINEA. New Ireland Province:** junction of Niagara and Weitin rivers, expedition camp 2, lowland rainforest, 4°30.210' S, 152°56.242' E, 240 m, Jan 1994 (fl, spirit), W. Takeuchi & J. Wiakabu 9976 (A, K, L, LAE).

Widespread in New Guinea, the Bismarck Archipelago, and Southeast Asia.

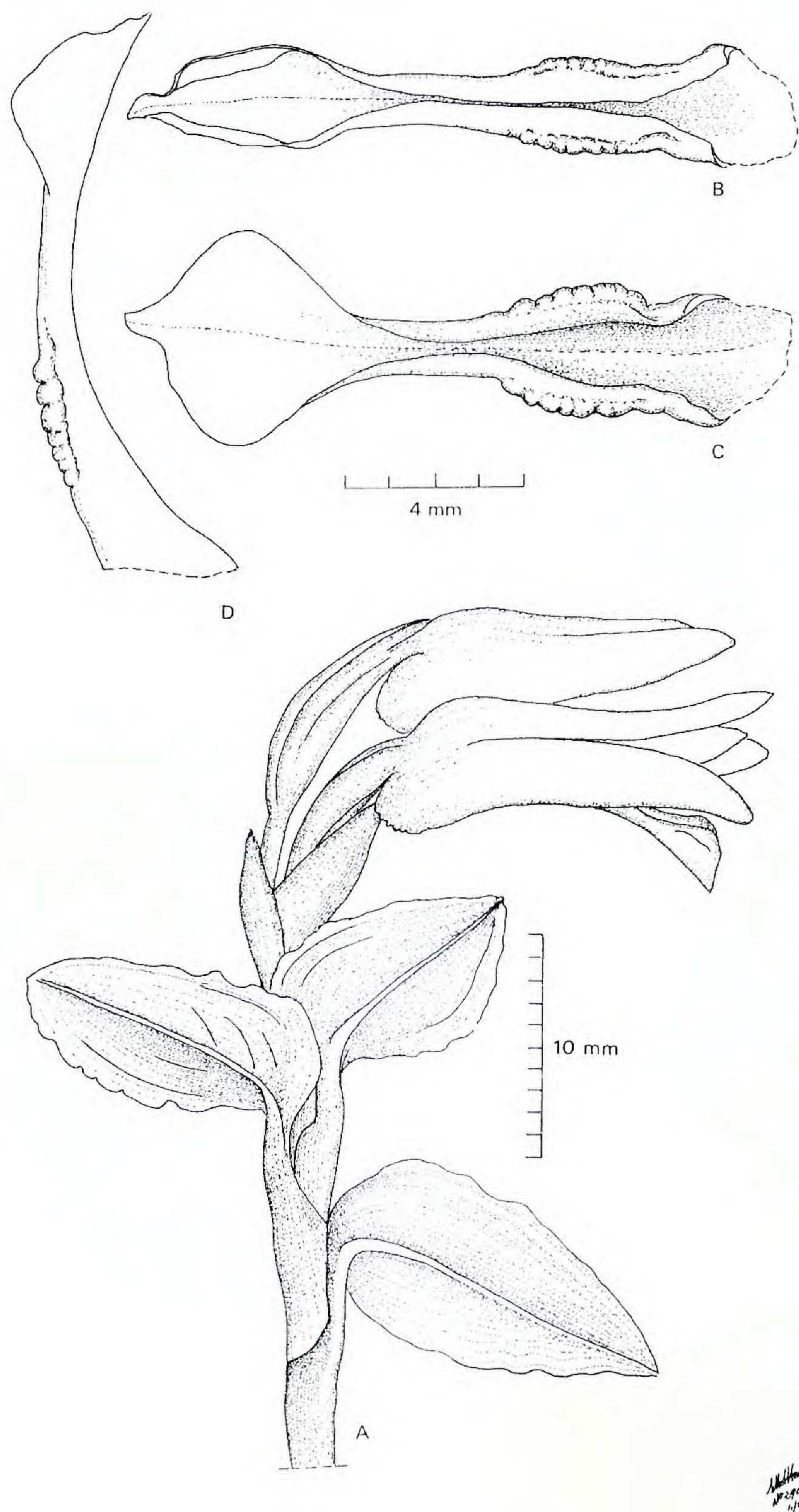


FIG. 10. *Pristiglottis montana* (Schltr.) Cretz. & J.J. Sm. **A.** Flowering habit. **B.** Labellum from above. **C.** ditto, with parts flattened. **D.** Labellum, from side. Scale bars: A, 10 mm; B–D, 4 mm. Drawn from *W. Takeuchi & J. Wiakabu 9394* by N.H.S. Howcroft.



FIG. 11. *Bulbophyllum pachyglossum* Schltr. **A**. Flowering habit. **B**. Flower, from side. **C**. Dorsal sepal. **D–E**. Petals. **F**. Lateral sepal. **G**. Labellum and column, side view. **H**. Labellum, side view. **I**. Labellum frontal view (material distorted). Scale bars: A, 5 cm; B–G, 10 mm; H–I, ×12. Drawn from *W. Takeuchi & J. Wiakabu 9375* by N.H.S. Howcroft.

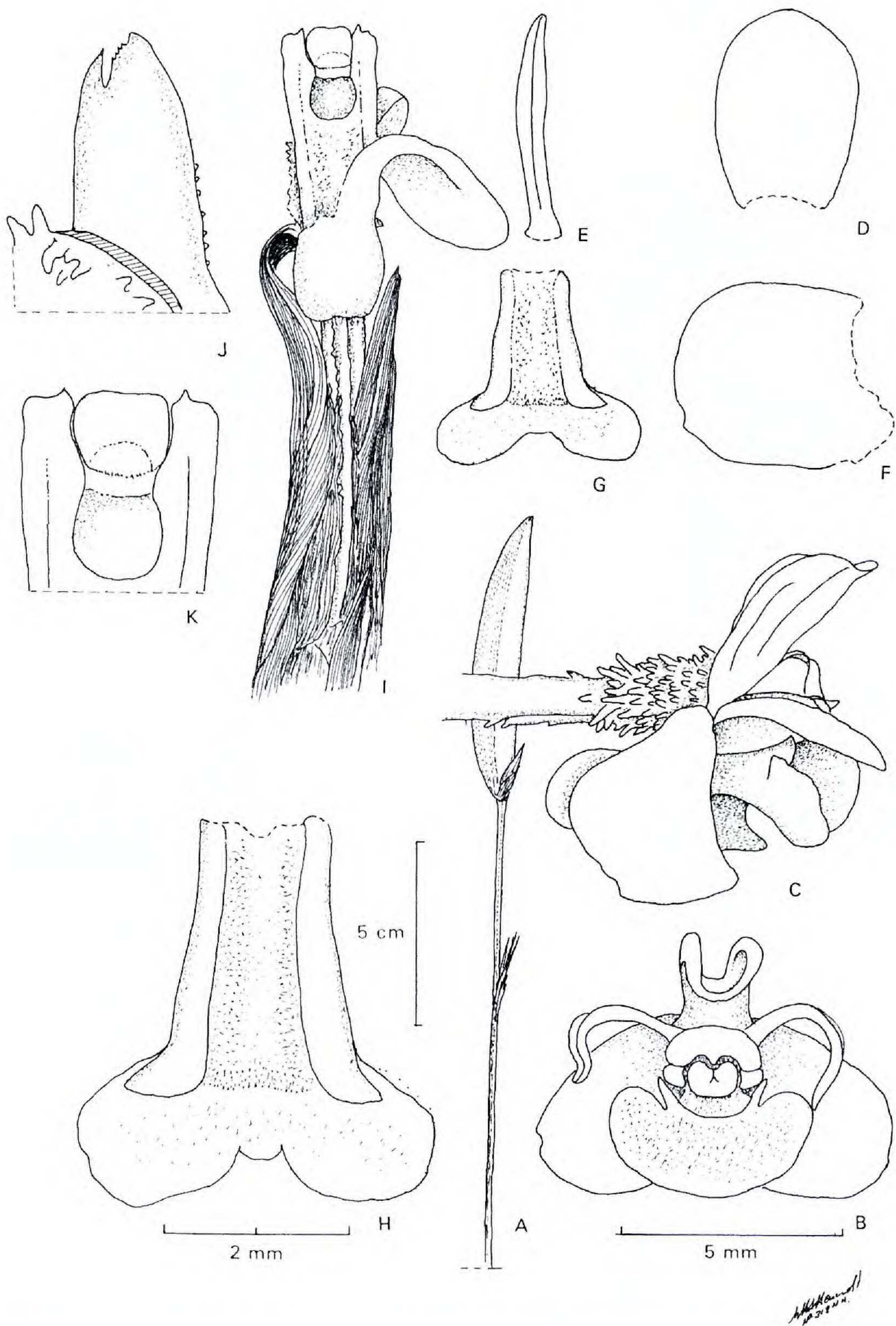


FIG. 12. *Cadetia echinocarpa* Schltr. A. Stem and leaf. B. Flower, frontal view. C. Flower and ovary, side view. D. Dorsal sepal. E. Petal. F. Lateral sepal. G. Labellum, from above. H. ditto. I. Partly dissected flower, showing anther, column, stigma, spur, and sheaths. J. Column, side view, without anther. K. Column apex from below, showing anther and stigma. Scale bars: A, 5 cm; B–G, 5 mm; H, 2 mm; I, 5 mm; J–K, 2 mm. Drawn from *W. Takeuchi & J. Wiakabu 9884* by N.H.S. Howcroft.

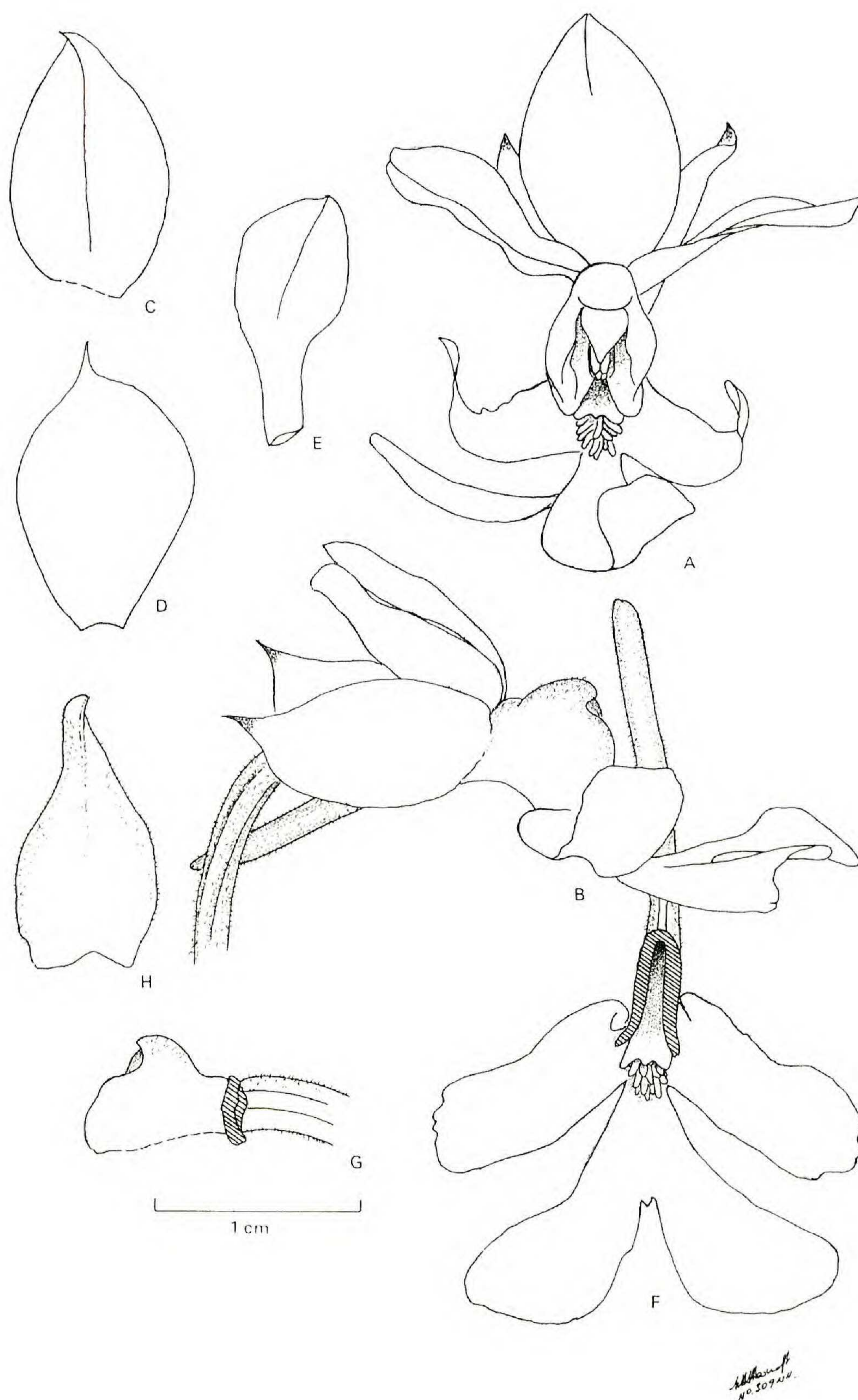


FIG. 13. *Calanthe triplicata* (Willemet) Ames. **A.** Flower, frontal view. **B.** Flower, side view. **C.** Dorsal sepal. **D.** Lateral sepal. **E.** Petal. **F.** Labellum with spur, from above. **G.** Column, side view. **H.** Floral bract. Scale bars: A–H, 1 cm. Drawn from *W. Takeuchi & J. Wiakabu 9976* by N.H.S. Howcroft.

Dendrobium cuthbertsonii F. Muell., Trans. Roy. Soc. Victoria 24:175. 1888. (Fig. 14).

Specimens examined: **PAPUA NEW GUINEA. New Ireland Province:** Hans Meyer Range, Angil Mountain, expedition camp 4, pristine subcloud forest dominated by bryophytic and ferny growth, 4°25.2' S, 152°56.8' E, 1800 m, 3 Feb 1994 (fl, spirit), W. Takeuchi & J. Wiakabu 9341 (LAE); *ibid.*, 4 Feb 1994 (fl), W. Takeuchi & J. Wiakabu 9400 (LAE); *ibid.*, 6 Feb 1994 (fl, spirit), W. Takeuchi & J. Wiakabu 9452 (A, LAE).

The surface of the leaves is not verrucose, as in most mainland provenances.

Dendrobium masarangense Schltr. ssp. **masarangense**, Repert. Spec. Nov. Regni Veg. 10:78. 1911. (Fig. 15).

Specimen examined: **PAPUA NEW GUINEA. New Ireland Province:** Hans Meyer Range, ridge adjacent to the Weitin River, expedition camp 3, mossy montane forest, 4°27.205' S, 152°56.489' E, 1175 m, 26 Jan 1994 (fl, spirit), W. Takeuchi & J. Wiakabu 9534 (LAE).

The white-flowered ssp. *masarangense*, with a light yellow-tipped labellum, is widespread and common on high islands. Lewis and Cribb (1991: 188) list its distribution as Sulawesi to New Guinea, New Britain, Bougainville, Guadalcanal, Vanuatu, Fiji, and New Caledonia. The senior author has examined this subspecies *in situ* from the Lelet plateau of New Ireland. However much of the habitat there has been recently destroyed by agricultural development and the orchid has now disappeared from that locality.

Dendrobium rhodostictum F. Muell. & Kraenzl., Oest. Bot. Zeit. 44:300. 1894. (Fig. 16).

Specimens examined: **PAPUA NEW GUINEA. New Ireland Province:** Hans Meyer Range, ridge adjacent to the Weitin River, expedition camp 3, mossy montane forest, 4°27.205' S, 152°56.489' E, 1175 m, 25 Jan 1994 (fl, spirit), W. Takeuchi & J. Wiakabu 9514 (LAE); junction of Niagara and Weitin rivers, expedition camp 2, lowland rainforest, 4°30.210' S, 152°56.242' E, 240 m, Jan 1994 (fl), W. Takeuchi & J. Wiakabu 9974 (LAE).

Previously recorded from New Ireland. The pseudobulbs of these specimens are less clavate than other collections from New Britain, Bougainville, and the mainland, but the perianth segments and callus agree perfectly in shape and size to the species.

Goodyera rubicunda (Bl.) Lindl., Bot. Reg. 25: 61, misc. 92. 1839. (Fig. 17). *Neottia rubicunda* Bl., Bijdr. 408. 1825.

Specimen examined: **PAPUA NEW GUINEA. New Ireland Province:** junction of Niagara and Weitin rivers, expedition camp 2, lowland rainforest, 4°30.210' S, 152°56.242' E, 240–300 m, 13 Feb 1994 (fl, spirit), W. Takeuchi & J. Wiakabu 9808 (A, K, L, LAE).

In the broad sense, *Goodyera rubicunda* is distributed throughout Malesia, from peninsular Malaysia to Samoa.

Spathoglottis plicata Bl., Bijdr. Fl. Ned. Ind. 5: 401. 1825. (Fig. 18).

Specimen examined: **PAPUA NEW GUINEA. New Ireland Province:** junction of Niagara and Weitin

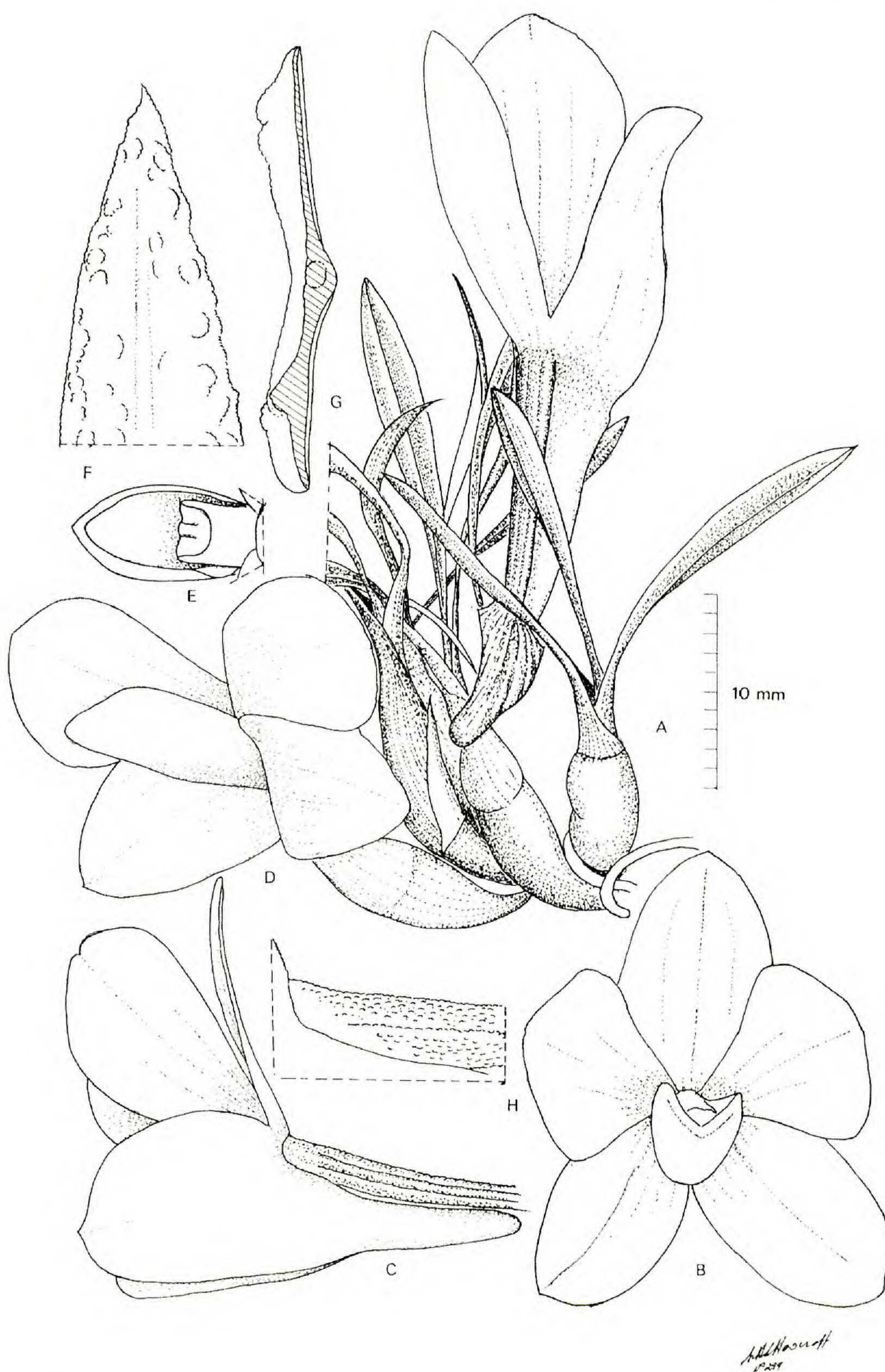


FIG. 14. *Dendrobium cuthbertsonii* F. Muell. A. Flowering habit. B. Flower, frontal view. C. Flower and spur, side view. D. Flower and labellum, side view. E. Labellum and column, from above. F. Enlarged view of leaf tip showing surface sculpting. G. Leaf in cross-section. H. Enlarged view of ovary surface. Scale bars: A–E, 10 mm. Drawn from *W. Takeuchi & J. Wiakabu 9452* by N.H.S. Howcroft.

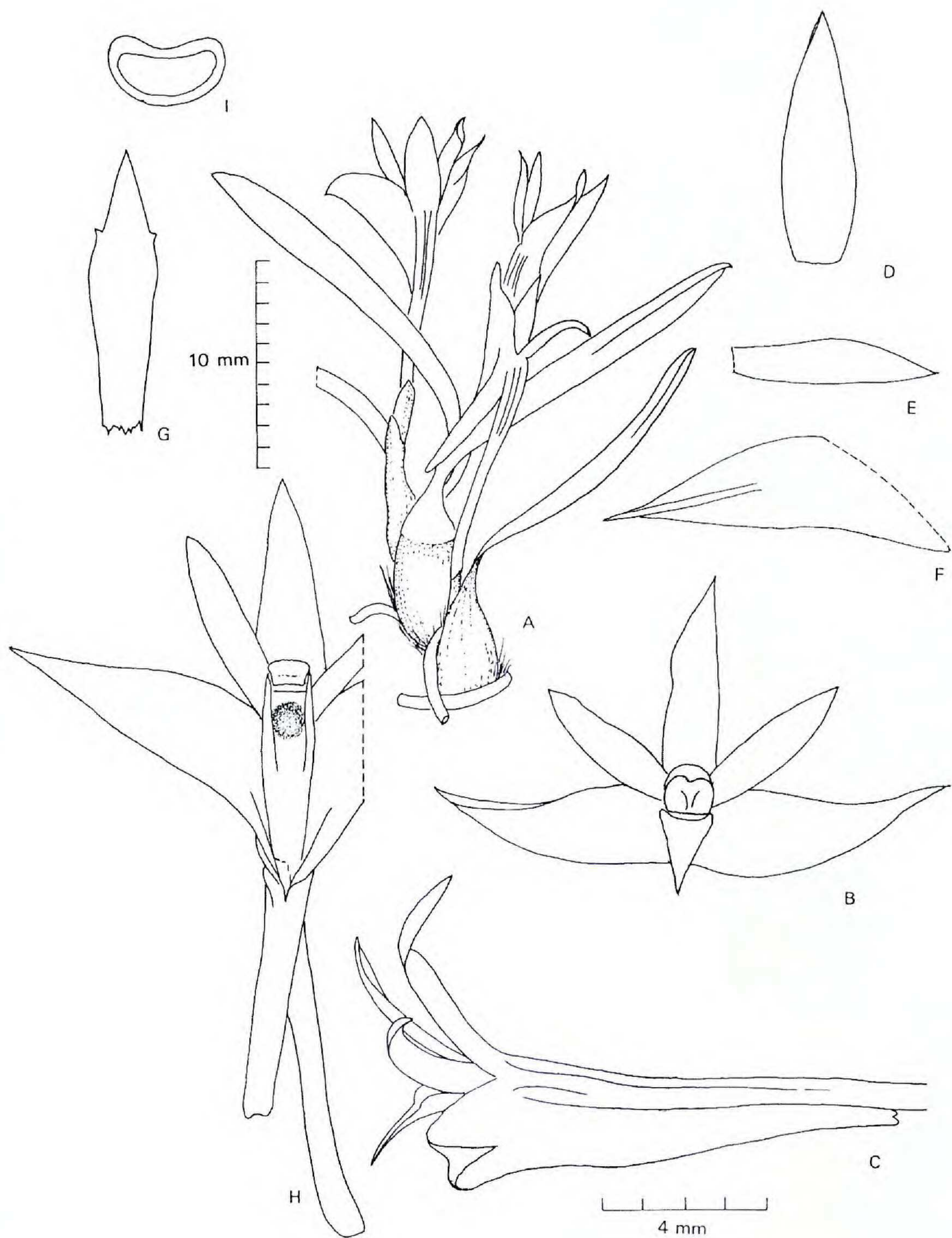


FIG. 15. *Dendrobium masarangense* Schltr. ssp. *masarangense*. **A.** Flowering habit. **B.** Flower, frontal view. **C.** Flower and spur, side view. **D.** Dorsal sepal. **E.** Petal. **F.** Lateral sepal. **G.** Labellum (basal part omitted). **H.** Flower with labellum removed, showing column, anther, stigma, and spur. **I.** Leaf cross-section. Scale bars: A, 10 mm; B–I, 4 mm. Drawn from *W. Takeuchi & J. Wiakabu 9534* by N.H.S. Howcroft.

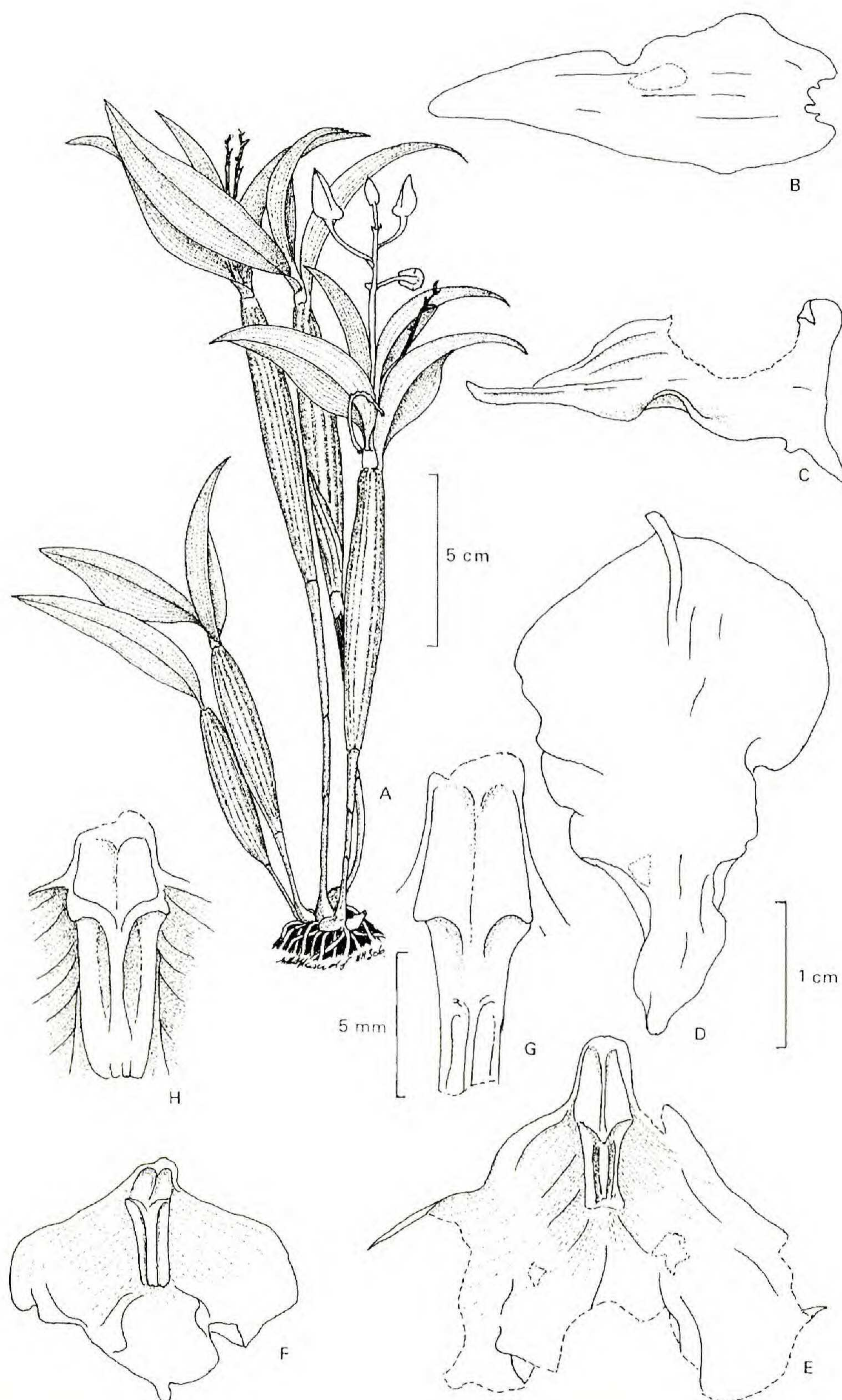


FIG. 16. *Dendrobium rhodostictum* F. Muell. & Kraenzl. **A.** Flowering habit. **B.** Dorsal sepal. **C.** Lateral sepal. **D.** Petal. **E.** Labellum (damaged). **F.** Labellum from unopened flower. **G.** Callus from mature labellum (in subdiagram E). **H.** Callus from immature labellum (in subdiagram F). Scale bars: A, 5 cm; B–F, 1 cm; G–H, 5 mm. Drawn from W. Takeuchi & J. Wiakabu 9514 by N.H.S. Howcroft.

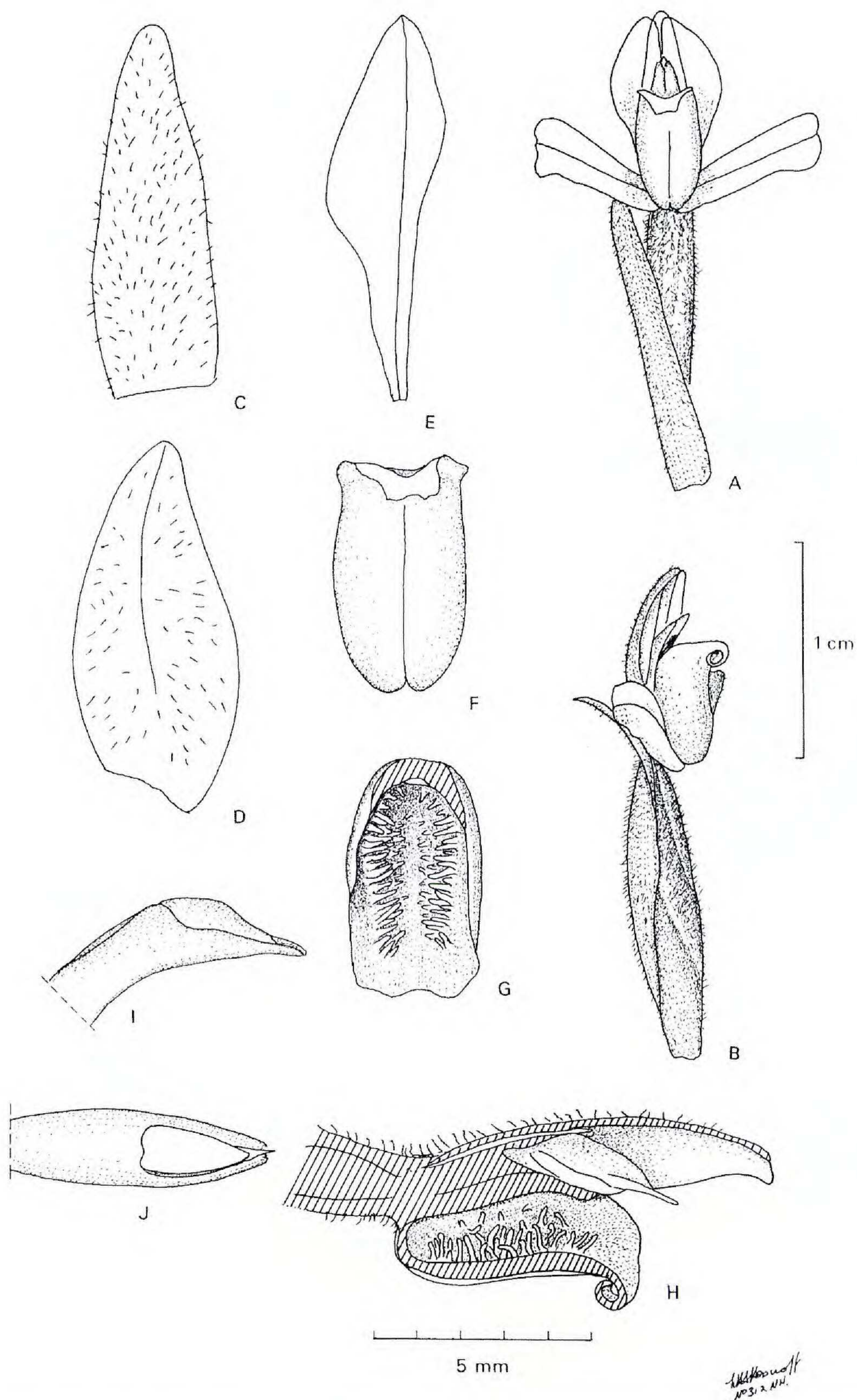


FIG. 17. *Goodyera rubicunda* (Bl.) Lindl. **A.** Flower, frontal view. **B.** Flower, side view. **C.** Dorsal sepal. **D.** Lateral sepal. **E.** Petal. **F.** Labellum, frontal view. **G.** Labellum, from above. **H.** Column and labellum in cross-section. **I.** Column. **J.** Anther. Scale bars: A–B, 1 cm; C–J, 5 mm. Drawn from *W. Takeuchi & J. Wiakabu 9808* by N.H.S. Howcroft.

rivers, expedition camp 2, lowland rainforest, 4°30.210' S, 152°56.242' E, 240 m, Jan 1994 (fl, fr, spirit), W. Takeuchi & J. Wiakabu 9972 (LAE).

The New Ireland specimen undoubtedly belongs to the *S. plicata* complex. However the ligulate lateral lobes on the labellum, with virtually no dilation of the apices, indicate that this is not subspecies *plicata*. The lack of a distinctly arched column is suggestive of cleistogamy.

Spathoglottis taxa are distinguished primarily by the labellum, especially by the shape and angle of the lateral lobes, shape/size of the callus and its vestiture, and by claw length and width. Plant habit and morphology is of value in defining sections and subspecies (Howcroft 1986). Research by the senior author indicates that six subspecies of *S. plicata* are present in the New Guinea region, of which four have been recorded from the Bismarck Archipelago. A formal revision of Malesian *Spathoglottis* will appear in a future publication by the first author.

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REFERENCES

- BEEHLER, B. and L.E. ALONSO (eds). 2001. Southern New Ireland, Papua New Guinea: a biodiversity assessment. RAP Bulletin of Biological Assessment 21, Conservation International, Washington, DC.
- CRIBB, P.J. 1983. A revision of *Dendrobium* sect. *Latouria*. Kew Bull. 38:229–306.
- CRIBB, P.J. 1986. A revision of *Dendrobium* sect. *Spatulata*. Kew Bull. 41:615–692.
- CRIBB, P.J. and C.Z. TANG. 1982. *Spathoglottis* in Australia and the Pacific Islands. Kew Bull. 36:721–729.

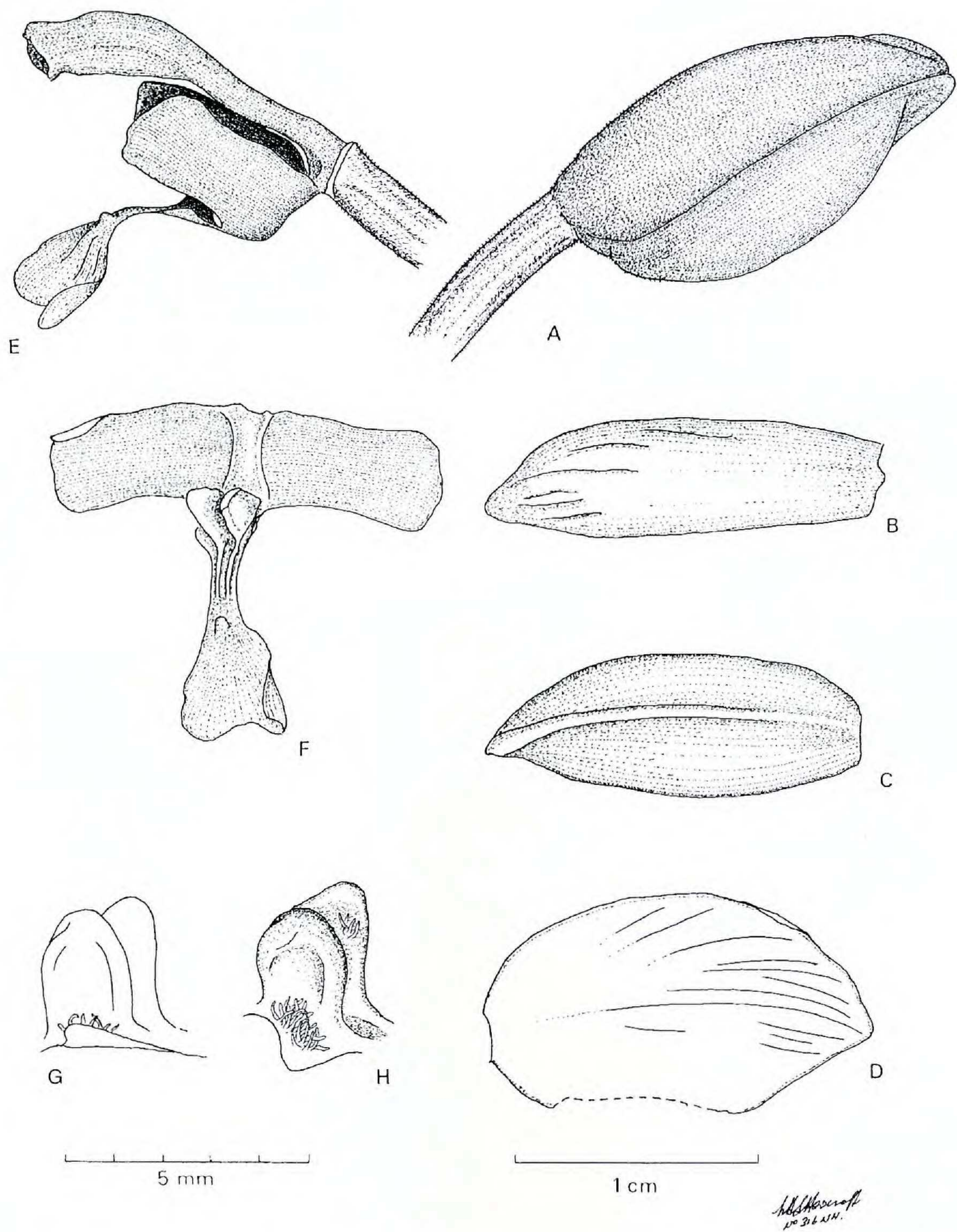


FIG. 18. *Spathoglottis plicata* Bl. **A**. Mature bud. **B**. Dorsal sepal. **C**. Lateral sepal. **D**. Petal. **E**. Column with labellum, side view. **F**. Labellum, from above. **G–H**. Bilobed callus. Scale bars: A–F, 1 cm; G–H, 5 mm. Drawn from *W. Takeuchi & J. Wiakabu 9972* by N.H.S. Howcroft.

- DOCKRILL, A.W. 1992. Australian indigenous orchids, revised edition. Surrey Beatty & Sons Pty Ltd, NSW Australia.
- HALLÉ, N. 1977. Flore de la Nouvelle-Calédonie et Dépendances 8: Orchidacées. Muséum National d'Histoire Naturelle, Paris.
- HOWCROFT, N.H.S. 1986. The taxonomy of *Spathoglottis* Bl. Orchadian 8:139–150.
- HOWCROFT, N.H.S. 1994. Orchid collections from New Ireland. Orchid Res. Bull. 3. Papua New Guinea Forest Research Institute.
- JOHNS, R.J. 1993. Biodiversity and conservation of the native flora of Papua New Guinea. In: B. Beehler, ed. Papua New Guinea conservation needs assessment report, vol. 2. PNG Dept. of Environment and Conservation, Boroko. Pp 15–222.
- KORES, P.J. 1989. A precursory study of Fijian orchids. Allertonia 5:1–222.
- LAVARACK, P.S., W. HARRIS, and G. STOCKER. 2000. *Dendrobium* and its relatives. Kangaroo Press, NSW, Australia.
- LEWIS, B.A. and P.J. CRIBB. 1989. Orchids of Vanuatu. Royal Botanic Gardens Kew. Whitestable Litho Printers Ltd.
- LEWIS, B.A. and P.J. CRIBB. 1991. Orchids of the Solomon Islands and Bougainville. Royal Botanic Gardens, Kew. Whitestable Litho Printers Ltd.
- O'BYRNE, P. 1994. Lowland orchids of Papua New Guinea. SNP Publishers Pty Ltd Singapore.
- REEVE, T.M. and P.J.B. WOODS. 1990. A revision of *Dendrobium* sect. *Oxyglossum* (Orchidaceae). Notes Royal Bot. Gard. Edinb. 46:1–305.
- ROYEN, P. VAN. 1980. The orchids of the high mountains of New Guinea. J. Cramer, Germany. Reprinted from: P. van Royen. 1979. The Alpine flora of New Guinea. Vol. 2. Orchidaceae. J. Cramer, Germany. Pp 51–812.
- ROYEN, P. VAN. 1983. The genus *Corybas* in its eastern areas. Phanerogamarum Monographiae Tomus XVI. J. Cramer, Germany.
- SCHLECHTER, R. 1911–14. Die Orchidaceen von Deutsch-Neu-Guinea. Feddes Repert. Spec. Nov. Regni Veg. Beih. 1:1–1079. English translation 1982. D.F. Blaxell, ed. The Australian Orchid Foundation, Melbourne.
- SEKHRAN, N. and S. MILLER (eds). 1995. Papua New Guinea country study on biological diversity. Colorcraft Ltd, Hong Kong.
- SMITH, J.J. 1913. Orchidaceae. Nova Guinea 12:1–108, t.14, 39.
- TAKEUCHI, W. and M. GOLMAN. 2001. Botanical documentation imperatives: some conclusions from contemporary surveys in Papuasia. Sida 19:445–468.
- TAN, K. 1975. Taxonomy of *Arachnis*, *Armodorum*, *Esmeralda* and *Dimorphorchis* (Orchidaceae), Part I. Selbyana 1:1–15.
- TAN, K. 1976. Taxonomy of *Arachnis*, *Armodorum*, *Esmeralda* and *Dimorphorchis* (Orchidaceae), Part II. Selbyana 1:365–373.